Claims 34-38 have been added. No new matter is added by the new claims. Support for new claim 34 is at least in original claims 1 and 7. New claims 35-38 are supported by original claims 7-10 respectively.

At page 3, paragraph 4, of the Office Action, the Examiner has indicated that several foreign references were not considered because an English language translation was not provided. However, the Examiner is respectfully requested to consider the non-English references to the extent that she can.

Rejection Under §112

The Examiner has rejected claims 1-16 and 32 under 35 U.S.C. §112, second paragraph, as being indefinite. With respect to claim 1, the Examiner states that the phrase "surface of a plastic material from monomers containing" is unclear as to whether the surface is "made from," "obtained from," or "derived from" monomers. Applicants traverse this rejection because the specification explains this language and with respect to the plastic material such that the plastic includes monomers within its change that have within the monomer the claimed structural element (A). This is supported in the specification at page 3, line 2-11; page 4; line 19 to page 5, line 23. Additionally, the specification at page 3, lines 8-14 further clarifies what is meant by a surface of a plastic material that is made from monomers.

With respect to claims 2-13 and 32, the Examiner states that these claims have improper antecedent bases in reciting "Interactive system according to claim. . .." By the present Amendment, claims 2-13 and 32 have been amended to provide proper antecedent bases, as the Examiner suggested.

With respect to claim 3, the Examiner states that the phrase "the plastic material is a plastic material from" recites improper Markush language. The Examiner also states that the phrase "with other polymerizable substances" renders the claim indefinite. Applicant has amended claim 3 to read as follows: "the plastic material selected from the group consisting of . . ." Applicant has also amended the claim to clarify that the plastic material is at least one polymer from the group consisting of a polymethacrylate, a polyvinylester and copolymers thereof.

With respect to claim 4, the Examiner states that the phrase "the linker is selected from" recites improper Markush language. Applicant has amended claim 4 to read as follows: "the linker is selected from the group consisting of. . . ," as suggested by the Examiner.

With respect to claim 5, the Examiner states that the term, "spun material" is vague and indefinite. Applicants submit that the term "spun material" is a term of art that is well understood in the art. See for example, Rodriquez, Ferdinand, Principles of Polymer Systems, 3rd ed. 1989) attached hereto.

With respect to claim 6, the Examiner states that the phrase, "the system is present in the form of a capillary tube system. . . " is indefinite. Applicants have changed the phrase, "the system is present in the form of capillary tube system" to the phrase, "the system is comprised within a capillary tube system. . . ."

With respect to claim 7, that claim has been canceled such that this rejection is moot.

With respect to claim 8, now claim 36, the Examiner states that the abbreviation "Ni-NTA" is indefinite. "Ni-NTA" is the standard term in the field of immunology for

abbreviating "nickel-nitrilotriacetic acid," and is therefore, not indefinite. However, to facilitate prosecution of the application, claim 36 recites the expanded form, "nickel-nitrilotriacetic acid, in parenthesis following the abbreviation, "Ni-NTA."

With respect to claim 9, now claim 37, the Examiner states that the phrase, "the protein is selected from" is improper Markush language. By the present Amendment, the phrase has been changed to recite the phrase, "the protein is selected from the group consisting of. . . ."

With respect to claim 10, now claim 37, the Examiner states that the word, "chemilumenescent" is spelled incorrectly. Applicants have corrected the spelling and claim 37 recites the correctly spelled word, "chemiluminescent."

With respect to claim 12, the Examiner states that the phrase, "an anticoagulant selected from" recites improper Markush language. This rejection is moot, since by the present Amendment the applicants have canceled claim 12.

With respect to claim 14, the Examiner states that this claim is indefinite because it fails to point out what is included or excluded by the claim language. The Examiner also states that the claim is an omnibus claim. Applicants traverse this rejection because claim 14 clearly and specifically points out the metes and bounds of what it claims since it is limited by the elements of claim 1. Therefore, claim 14 is a proper dependent claim.

With respect to claim 15, the Examiner states that this claim is indefinite because it fails to point out what is included or excluded by the claim language. The Examiner also states that there is improper antecedent basis for the phrase, "the composition according to claim. . . " and that the phrase, "in the form of. . ." is unclear. Applicant has amended claim 15 to provide proper antecedent basis. Applicant has also amended claim 15 to clarify that the composition is

comprised within a type of food. The Examiner also states that claim 15 is an omnibus claim. Applicants traverse this rejection because claim 15 clearly and specifically points out the metes and bounds of what it claims. Claim 15 is a proper dependent claim.

With respect to claim 16, the Examiner states that this claim is indefinite because it fails to point out what is included or excluded by the claim language. The Examiner also states that the phrase, "in the form of. . ." is indefinite because it is unclear what Applicant intends to encompass. By the present Amendment, applicants have changed the phrase, "in the form of" to the phrase, "wherein the composition is. . . ." The Examiner further states that claim 16 is an omnibus claim. Applicants traverse this rejection because claim 16 clearly and specifically points out the metes and bounds of what it claims. Claim 16 is a proper dependent claim.

With respect to claim 32, the Examiner states that claim 32 is indefinite because it fails to point out what is included or excluded by the claim language. Claim 32 has been amended to more clearly state that the interactive system is used for preparing an agent. The Examiner further states that claim 32 is an omnibus claim. Applicants traverse this rejection because claim 32 clearly and specifically points out the metes and bounds of what it claims. Claim 32 is a proper dependent claim.

In light of the foregoing, it is respectfully requested that the Examiner reconsider and withdraw the §112 rejections.

Rejection Under §102(b) Based upon Daniel

The Examiner has rejected claims 1-8 and 14 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,086,199 of Daniel ("Daniel"). The Examiner asserts that Daniel discloses an interactive system which is formed of latex polymer particles which function as

biological carriers for protein substances. The Examiner states that the particles have a core which comprises alkyl acrylates and methacrylates and a cross-linker comprising polyethylene glycol dimethacrylate which gives the polymer particles greater resistance to solvents. The Examiner further asserts that the latex particles of Daniel are very stable, chemically and mechanically, at extended periods of time, remain stable at varying pH levels and temperature (copolymerization temperature ranges from 5 to 90°C) and that the biologically active substances, such as proteins, are coupled or adsorbed into the carrier particles. Applicants respectfully, but strenuously traverse the §102(b) rejection of claims 1-8 and 14 for the reasons set forth below.

The present invention is an interactive system that contains three components. The first component is one surface of a plastic material that is made from monomers and contains at least one structural element (A) derived from a carboxylic acid. The second component is a linker with at least one structural element (B) that is capable of establishing a hydrogen bond. The third component is a substance coupled to the linker. This interactive system can be comprised within a capillary tube system, a filter for physiological liquids, a dialyzer, a physiological replacement fluid, an enzyme system, among other things. The composition of the interactive system can be used in foods, preferably dietary foods or designer foods. Further, the interactive system can be adapted for treatment of disorders, such as metabolic diseases, malignant diseases, among other disorders.

In order to anticipate a claim, the reference must teach or suggest each element of the claim. Daniel fails this test. Daniel's invention is directed to polymer particles latexes. The particles comprise a core selected from the group of a vinyl homopolymer, and a vinyl

copolymer; and a periphery formed by a copolymer having a large number of –CN groups (col. 1, lines 46-49). The core of the particle may comprise a cross-linked homopolymer or copolymer of vinyl monomers, such as alkyl acrylates and methacrylates. The monomer containing –CN groups may be hydrogen bonded to an alkyl group or an aryl group. Daniel also discloses a cross-linking vinyl monomer such as polyethylene glycol dimethacrylates.

The present invention recites a plastic device capable of establishing a hydrogen bond with a substance coupled to a linker. The plastic device is made of a plastic material, such as poly(meth)acrylate or a poly(meth)acrylate copolymer. The plastic material is bonded to a linker which may be a polyethylene glycol with substance coupled to the linker. The substance coupled to the linker is an anticoagulant.

Daniel's invention is a polymer particle latex, it is not an interactive system that contains three components as presently claimed. Daniel does not disclose the first component, that is one surface of a plastic material that is made from monomers and contains at least one structural element (A) derived from a carboxylic acid. Nor does Daniel disclose the second component, that is a linker with at least one structural element (B) that is capable of establishing a hydrogen bond. Since, Daniel does not disclose the linker, it also does not disclose a substance coupled to the linker.

Additionally, Daniel does not teach use of an anticoagulant. Daniel also does not teach or suggest the specific anticoagulants claimed in the present invention. In contrast, the presently claimed invention recites a coupled substance, that is an anticoagulant.

For at least the reasons given above, Daniel does not teach each element of claims 1-8 and 14. Therefore, Daniel does not anticipate the present claims under 35 U.S.C. § 102(b).

Consequently, it is respectfully requested that the Examiner reconsider and withdraw the § 102(b) rejection based upon Daniel.

Rejection Under §102(b) Based on DeCrosta

The Examiner has rejected claims 1-8, 11, 13-14, 16, and 32 under 35 U.S.C. § 102(b) as being "inherently" anticipated by U.S. Patent No. 4,575,539 of DeCrosta et al. ("DeCrosta "). The Examiner asserts that DeCrosta discloses a drug delivery system in the form of hydrogel beads including interpenetrating polymer network which have superior drug loading and release capacity, a first polymer substrate comprising acrylic swelling agent, methyl methacrylate or acrylic acid, and a crosslinking agent, ethylene glycol dimethacrylate. The Examiner states that the hydrogel beads are located with pharmaceutical active compositions wherein the loading is accomplished by swelling the hydrogel and that the pharmacologically active drugs include those enumerated in column 6, lines 32-62. Applicants respectfully, but strenuously traverse the §102(b) rejection of claims 1-8, 11, 13-14, 16, and 32 for the reasons set forth below.

DeCrosta teaches a polymer network drug delivery system that comprises a hydrogel polymer. The polymer network comprises a water swellable first polymer substrate (which will be in the form of hydrogel beads) interpenetrated by a diffusion rate controlling membrane comprised of a second cross-linked polymer formed of the reaction product of an acrylic swelling agent (for the hydrogel beads), and cross-linking agent, which reaction product is preferably formed in the presence of a polymerization initiator (col. 3, lines 21-30).

DeCrosta's invention is a polymer network drug delivery system, it is not an interactive system that contains three components as presently claimed. DeCrosta does not

disclose the surface of a plastic material from monomers with at least one structural element (A) derived from a carboxylic acid. Nor does DeCrosta disclose the linker with at least one structural element (B) that is capable of establishing a hydrogen bond. Since, DeCrosta does not disclose the linker, it also does not disclose a substance coupled to the linker.

Additionally, DeCrosta does not teach an anticoagulant or the specific anticoagulants claimed in the present invention. In contrast, the presently claimed invention recites an anticoagulant that is coupled to a linker.

For at least the reasons given above, DeCrosta does not teach each element of claims 1-8, 11, 13-14, 16, and 32. Therefore, DeCrosta does not anticipate the present claims under 35 U.S.C. § 102(b). Consequently, it is respectfully requested that the Examiner reconsiders and withdraws the § 102(b) rejection based upon DeCrosta.

Rejection Under §102(e) Based upon Cha

The Examiner has rejected claims 1-11, 13-14, 16, and 32 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 5,665,428 of Cha *et al.* ("Cha"). The Examiner asserts that Cha discloses peptide/protein biodegradable drug delivery systems prepared as microspheres or hydrogels which are useful and stable at high temperatures, i.e., 50°C. The Examiner states that Cha teaches the microsphere as ABA block copolymers comprising a hydrophilic B block segment which is preferably polyethylene glycol, and a biodegradable hydrophobic A block segment which can be polyethylene carbonate. The Examiner also states that the release profile of the pharmaceutically active drugs, listed at col. 9, lines 41-53, from the polymers may be adjusted by the addition of carboxyl functional group into the hydrophobic block; thereby, further extending a sustained release of the drug. Applicants respectfully, but

strenuously traverse the §102(b) rejection of claims 1-11, 13-14, 16, and 32 for the reasons set forth below.

Cha's invention is directed to a peptide/protein biodegradable drug delivery device. Cha teaches a copolymer that can be processed into microspheres at temperatures below 100 °C (col. 6, lines 59-60). The copolymers disclosed in Cha contains hydrophobic A block segments and hydrophilic B block segments (col. 9, lines 15-18). The hydrophobic A block segments are biodegradable amorphous hydrophobic polymers, selected from the group consisting of poly(α-hydroxy acids)) and polyethylene carbonate (col. 8, lines 36-39). The hydophilic B block segment are water soluble polymers, preferably polyethylene glycol (col. 8, lines 35-36).

Cha does not teach an anticoagulant including the specific anticoagulants claimed in the present invention. In contrast, the presently claimed invention can include a poly(meth)acrylate or a poly(meth)acrylate copolymer that is hydrogen bonded to plastic material, such as polyethlyene glycol and having an anticoagulant. Specific anticoagulants, namely heparin, hirudin, directly acting antithrombins and prothrombin are also recited in claim 34 of the present invention.

Further, Cha does not mention the use of a poly(meth)acrylate or a poly(meth)acrylate copolymer as in claim 3. The block copolymer of Cha, made of hydrophobic A block segments and hydophilic B block segments do not include the plastic material of the present invention, namely a plastic material such as a poly(meth)acrylate or a poly(meth)acrylate copolymer.

For at least the reasons given above, Cha does not teach each element of claims 1-11, 13-14, 16, and 32. Therefore, Cha does not anticipate the present claims under 35 U.S.C. § 102(e). Consequently, it is respectfully requested that the Examiner reconsiders and withdraws the § 102(e) rejection based upon Cha.

Rejection Under §102(e) Based upon Hubbell

The Examiner has rejected claims 1-16 and 32 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 5,410,016 of Hubbell *et al.* ("Hubbell "). The Examiner asserts that Hubbell discloses photopolymerizable, biodegradable hydrogels as tissue contacting materials or controlled release carriers. The Examiner also asserts that the polymerizable region comprises dimethacrylates and oligomethacrylates, wherein the polymerizable macromer includes a core, an extension on each end, and an end cap wherein the core includes hydrophophilic polyethylene glycol. The Examiner states that the physiologically and pharmacologically active drugs for controlled delivery include proteins, hormones, enzymes, antibiotics and carbohydrates which include hyaluronic acid, heparin and heparin sulfate. Applicants respectfully, but strenuously traverse the §102(e) rejection of claims 1-16 and 32 for the reasons set forth below.

As discussed above, the present invention recites a plastic device having a hydrogen bonded constituent with an anticoagulant. The plastic device is made of a plastic material, such as poly(meth)acrylate or a poly(meth)acrylate copolymer. The plastic material is bonded to a linker with a substance coupled to the linker. The coupled substance is an anticoagulant. The present invention of claim 34 recites specific anticoagulants. Thus, the

presently claimed invention recites the presence of both a linker such as polyethylene glycol and an anticoagulant.

Hubbell discloses hydrogels of polymerized and crosslinked macromers with one water soluble region, one degradable region and free radical polymerizable end groups (col. 4, lines 31-36). The polymerizable regions can be attached directly to degradable extensions or indirectly via water soluble nondegradable sections as long as the polymerizable end groups are separated by at least one degradable region (col. 4, lines 40-47). The core water soluble region can consist of poly(ethylene glycol) or a carbohydrate such as heparin (col. 8, lines 40-48). Hubbell does not teach or suggest the use of linker, such as poly(ethylene glycol) and an anticoagulant, such as heparin in combination as do the presently claimed invention.

Accordingly, Hubbell does not teach each element of claims 1-16 and 32. Therefore, Hubbell does not anticipate the present claims under 35 U.S.C. § 102(e). Consequently, it is respectfully requested that the Examiner reconsider and withdraw the § 102(e) rejection based upon Hubbell.

## CONCLUSION

In view of the foregoing amendment and remarks, applicants respectfully submit that the pending claims, 1-6, 11, 13-16 and 32-37 are patentably distinct from the cited prior art and in condition for allowance. A Notice of Allowance is respectfully requested.

Respectfully submitted,

**ELKE BUCHA *ET AL.***

2/15/02 By: _____
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LLC:CJSC:cjsc
Enclosure

## Marked Up Version Of Claims

1. An interactive system comprising:

(a) one surface of a plastic material from monomers containing at least one structural element (A) derived from a carboxylic acid,

(b) a linker with at least one structural element (B) capable of establishing a hydrogen bond, and

(c) a substance coupled to the linker, wherein a stable interaction exists between the surface and the linker which comprises hydrogen bonds and which cannot be reversed by pH values in the range of from 2 to 13 or temperatures up to 60°C

wherein the substance coupled to the linker comprises an anticoagulant.

2. The interactive [Interactive] system according to claim 1, wherein the structural element (A) derived from a carboxylic acid is located in a side chain of the monomer.

3. The interactive [Interactive] system according to claim 1, wherein the plastic material is [a plastic material] at least one polymer selected from the group consisting of a polymethacrylate, a polyvinylester [or a] and copolymers thereof [, or a mixture thereof with other polymerizable substances].

4. The interactive [Interactive] system according to claim 1, wherein the linker is selected from the group consisting of (poly)alkylene glycols, (poly)ethylene glycols, (poly)alkylene imines, (poly)alkylene amines and (poly)alkylene sulfides.

5. The interactive [Interactive] system according to claim 1, wherein the [active] surface is a membrane, a porous or solid microparticle, a magnetic microparticle, a filter mat, a fibrous material, a spun material or a combination thereof, or a coating made from a natural or synthetic substance.

6. The interactive [Interactive] system according to claim 1, wherein the system [is present in the form of] is comprised within a capillary tube system, a filter for physiological liquids, a dialyzer, a physiological replacement fluid, an enzyme delivery system, an arthroplasty or vascular prosthesis, or an artificial organ.

11. The interactive [Interactive] system according to claim [7] 1, wherein the [active] substance coupled to the linker is [an anticoagulant,] selected from the group comprising a metabolically active enzyme, an antibiotic and a synthetic pharmacon.

13. The interactive [Interactive] system according to claim 1, wherein [the plastic material is poly(meth)acrylate or a poly(meth)acrylate copolymer, the linker is polyethylene glycol and] the coupled substance [is] further comprises an enzyme [or] and a pharmaceutical composition.

13. A composition [Composition] comprising an interactive system according to claim 1.

14. The composition [Composition] according to claim 14 [in the form of], wherein the composition is comprised within a type of food, preferably a dietary food or designer food.

15. The composition [Composition] according to claim 14 [in the form of], wherein the composition is a pharmaceutical composition.

32. The interactive [Interactive] system according to claim 1, adapted for [preparing an agent for] the treatment of disorders selected from the group consisting of metabolic diseases, coagulation defects, viral, bacterial, mycotic infections [or], parasitic infections [or] and malignant diseases.